

WHAT IS CLAIMED IS:

1. An exhaust emission control system for an internal combustion engine, comprising:

nitrogen oxides removing means provided in an exhaust system of said engine for removing nitrogen oxides in exhaust gases in a condition where an air-fuel ratio of an air-fuel mixture to be supplied to said engine is set to a lean region with respect to a stoichiometric ratio;

an oxygen concentration sensor provided downstream of said nitrogen oxides removing means for detecting the concentration of oxygen in the exhaust gases;

deterioration determining means for determining deterioration of said nitrogen oxides removing means on the basis of an output of said oxygen concentration sensor after the air-fuel ratio has been changed from the lean region to a rich region with respect to the stoichiometric ratio; and

abnormality determining means for determining abnormality of said oxygen concentration sensor on the basis of an output of said oxygen concentration sensor during a period in which the air-fuel ratio is kept in the rich region with respect to the stoichiometric ratio immediately after execution of the deterioration determination by said deterioration determining means.

2. An exhaust emission control system according to claim 1, wherein the abnormality determination by said abnormality determining means is executed if the output of said oxygen concentration sensor is kept unchanged before the end of the deterioration determination by said deterioration determining means.

3. An exhaust emission control system according to claim 1, wherein said abnormality determining means determines that said

oxygen concentration sensor is abnormal if the output of said oxygen concentration sensor is not changed from a value indicative of a lean air-fuel ratio to a value indicative of a rich air-fuel ratio within a predetermined period when the enrichment of the air-fuel ratio is continued over the predetermined period immediately after the end of the deterioration determination.

4. An exhaust emission control system according to claim 1, further comprising determination inhibiting means for inhibiting the abnormality determination by said abnormality determining means immediately after starting of said engine.

5. An exhaust emission control system for an internal combustion engine, comprising:

nitrogen oxides removing means provided in an exhaust system of said engine for removing nitrogen oxides in exhaust gases in a condition where an air-fuel ratio of an air-fuel mixture to be supplied to said engine is set to a lean region with respect to a stoichiometric ratio;

an oxygen concentration sensor provided downstream of said nitrogen oxides removing means for detecting the concentration of oxygen in the exhaust gases;

deterioration determining means for determining deterioration of said nitrogen oxides removing means on the basis of an output of said oxygen concentration sensor after said air-fuel ratio has been changed from the lean region to a rich region with respect to the stoichiometric ratio; and

abnormality determining means for determining that said oxygen concentration sensor is abnormal if a condition where the output of said oxygen concentration sensor indicates that the air-fuel ratio is in the rich region with respect to the stoichiometric ratio continues before execution of the deterioration determination by said

deterioration determining means.

6. An exhaust emission control system according to claim 5, further comprising determination inhibiting means for inhibiting the abnormality determination by said abnormality determining means immediately after starting of said engine.

7. An exhaust emission control system for internal combustion engine, comprising:

nitrogen oxides removing means provided in an exhaust system of said engine for removing nitrogen oxides in exhaust gases in a condition where an air-fuel ratio of an air-fuel mixture to be supplied to said engine is set to a lean region with respect to a stoichiometric ratio;

a downstream oxygen concentration sensor provided downstream of said nitrogen oxides removing means for detecting the concentration of oxygen in the exhaust gases;

enrichment means for setting the air-fuel ratio to a rich region with respect to the stoichiometric ratio when a condition where the output of said downstream oxygen concentration sensor indicates that the air-fuel ratio is in the lean region with respect to the stoichiometric ratio continues after the end of starting of said engine;

abnormality determining means for determining abnormality of said downstream oxygen concentration sensor on the basis of the output of said downstream oxygen concentration sensor during execution of the air-fuel enrichment by said enrichment means; and

lean operation inhibiting means for inhibiting that the air-fuel ratio is set to the lean region with respect to the stoichiometric ratio until the end of the abnormality determination of said downstream oxygen concentration sensor.

8. An exhaust emission control system according to claim 7,

wherein the enrichment of the air-fuel ratio by said enrichment means is allowed after starting of running of a vehicle on which said engine is mounted.

9. An exhaust emission control system according to claim 7, further comprising:

an upstream oxygen concentration sensor provided upstream of said nitrogen oxides removing means for detecting the concentration of oxygen in the exhaust gases; and

deterioration determining means for determining deterioration of said nitrogen oxides removing means on the basis of an output of said downstream oxygen concentration sensor after said air-fuel ratio has been changed from the lean region to a rich region with respect to the stoichiometric ratio;

wherein said deterioration determining means comprises deterioration determination enrichment means for switching the air-fuel ratio from the lean region to the rich region with respect to the stoichiometric ratio, and a reducing component amount calculating means for calculating an amount of reducing components flowing into said nitrogen oxides removing means from the time when the output of said upstream oxygen concentration sensor has changed to a value indicative of a rich air-fuel ration after starting of the enrichment of the air-fuel ratio by said abnormality determination enrichment means;

said deterioration determining means determining deterioration of said nitrogen oxides removing means on the basis of the amount of the reducing components calculated by said reducing component amount calculating means and the output of said downstream oxygen concentration sensor.

10. An exhaust emission control system according to claim 9, wherein said deterioration determining means determines that said nitrogen oxides removing means is deteriorated if the output of said

downstream oxygen concentration sensor indicates a rich air-fuel ratio when the amount of the reducing components has reached a predetermined amount.

11. An exhaust emission control system according to claim 9, wherein said reducing component amount calculating means calculates the amount of reducing components by integrating the amount of exhaust gases flowing into said nitrogen oxides removing means.

12. An exhaust emission control system according to claim 11, wherein said reducing component amount calculating means uses a basic fuel amount, which is set so that the air-fuel ratio becomes a constant value according to a rotational speed and an absolute intake pressure of said engine, as a parameter indicative of the amount of exhaust gases flowing into said nitrogen oxides removing device.